Management of a traumatically extruded maxillary incisor: a case report

ABSTRACT
This article reports on the management of a child with a traumatically extruded permanent incisor. Treatment was carried out within 24 hours from the time of injury and the tooth showed satisfactory pulpal and periodontal healing. The need for correct diagnosis and prompt treatment cannot be overemphasized.

Key words: Dentition, permanent; Incisor; Wounds and injuries

Introduction
Extrusive luxation is defined as partial displacement of the tooth out of its socket \(^1\). This type of dental injury is uncommon in the permanent dentition, and accounts for only 0.05 to 7% of all traumatized permanent teeth \(^1,2\). Injury of this type results in rupture of the periodontal ligament along with damage to the apical vessels; but the alveolar bone is not fractured, which distinguishes it from lateral luxative injury \(^1,3,4\). Clinically the tooth appears elongated and mobile, and is most often displaced towards the palatal side \(^1\). Early treatment for dental extrusion (within 24 hours) is recommended in order to achieve optimal healing \(^3,5\). Delayed treatment may hinder complete repositioning and impose the need for subsequent orthodontic intrusion \(^1,3,6\). This report describes the dental management of a boy with a traumatically extruded permanent maxillary incisor.

Case report
An 8-year-old boy sought treatment for dental trauma that happened during the previous evening, about 15 hours prior to his presentation. The boy had slipped and fallen when he was running in the corridor, and his teeth hit the ground. His medical history was unremarkable and all his vaccinations were up-to-date. On examination, there were no signs of neurological or extraoral injuries. Intraorally, he presented a class II division 1 malocclusion. Mucosal laceration was noted about 5 mm apical to the gingival margin of tooth 21, which extended horizontally from the labial frenum to the mesial gingiva of tooth 22 (Figure 1). Tooth 21 was mobile, appeared elongated and was displaced palatally. There was enamel fracture on its incisal edge. Enamel fractures were also seen in teeth 12 and 11; and enamel-dentine fracture was observed in tooth 22. Tooth 11 showed mild horizontal mobility of about 0.5 mm and was sensitive to percussion. Teeth 12 and 22 showed normal mobility and were not tender to percussion. All the traumatized teeth
responded to a cold test with ethyl chloride. Radiographic examination revealed mild coronal displacement of tooth 21, and that the root development of the maxillary incisors was incomplete (Figure 2). The mandibular incisors were also examined and they showed intact crown structures and normal mobility, and were not tender to percussion.

Under local anesthesia, the mucosal wound was examined and no alveolar fracture was observed (Figure 3). A diagnosis of extrusive luxation of tooth 21, subluxation of tooth 11, and uncomplicated crown fractures on all the maxillary incisors was made. Tooth 21 was then gently repositioned manually, and splinted to the adjacent teeth with a 0.016-inch round stainless steel wire and composite resin. The soft tissue wound was closed with black silk sutures (Figure 4). A postoperative radiograph revealed satisfactory repositioning of tooth 21. The sutures and splint were removed after 1 and 3 weeks, respectively, and healing was uneventful. The fractured central and lateral incisors were restored with composite resin. The patient was then reviewed in 6 weeks, 6 months and subsequently, annually. All the traumatized incisors showed a positive response to the ethyl chloride test at all the review visits. Clinical and radiographic examination 20 months after the injury
Management of an extruded incisor

 revealed satisfactory healing, with no signs of pulp necrosis or root resorption (Figure 5). Partial pulp obliteration was seen in tooth 21. Annual review of the patient’s progress will continue.

Discussion

In this case report, satisfactory healing was achieved in the traumatized incisors. Only a few studies have addressed the prognosis of traumatically extruded teeth and only two of them were conducted in children. Pulpal necrosis was found to be the most common complication after extrusive luxation. The major factor influencing pulp healing after extrusive luxation was the stage of root development; immature teeth showed better healing potential compared with mature teeth. More recent studies suggest that the degree of extrusion might also be an important factor.

Inflammatory or replacement resorption is seldom seen in these teeth. The tooth involved in this case, tooth 21, showed partial pulp canal obliteration, which is a common finding in extruded teeth after the pulp has been revascularized.

Sensibility testing of the traumatized teeth shortly after the injury is a controversial issue. A negative response to the initial test is not uncommon and should not be interpreted as a sign of pulp death. Nevertheless, such baseline findings serve as a point of reference for evaluating the pulpal status during follow-up visits. Tests of pulpal sensibility in traumatized teeth, using electric pulp tester or ethyl chloride, should therefore be performed at each review visit. In the management of this case, only occlusal radiographs were taken during the initial visit due to limited cooperation from the patient. An additional radiograph taken at a different angle, such as a periapical radiograph, should have been taken in order to rule out any root fracture. Nonetheless, this was done during the first review appointment.

The recommended treatment for dental extrusion is gentle repositioning and non-rigid splinting for 2 to 3 weeks. The arch wire/composite resin splint used in this case was one such example. Alternatively, a nylon fishing line can be used instead of an arch wire; the technique described by Fayle is easy to perform. A knot is tied in one end of the fishing line and the fishing line is wedged into an interproximal space distal to the last tooth to be included in the splint. The fishing line can be pulled across the teeth when the composite resin is being light-cured, and the ends of the fishing line are trimmed afterward. There is no strong evidence indicating the optimal duration of splinting, but splints that require forceful application such as cap splints are contra-indicated as they lead to pulp necrosis more frequently. Early treatment for traumatically extruded teeth is recommended, as delayed treatment might result in organization of the apical blood clot, making complete repositioning difficult. Forceful reduction in these cases is contra-indicated as it may lead to further trauma to the apical tissues. As a result, these teeth often require subsequent orthodontic alignment, which incurs higher treatment costs and requires a longer treatment period. Endodontic treatment, even for teeth with closed apices, should only be initiated when there is evidence of pulp necrosis or inflammatory root resorption. As healing complications...
are often seen within 12 months after trauma, a minimum review period of 1 year is generally recommended.\textsuperscript{1,3,4}

General dentists should be able to distinguish extrusive luxation from a lateral luxation injury. In both situations the tooth appears to be displaced coronally from its socket, but in lateral luxation there is fracture of the tooth socket and the tooth is often locked in the displaced position.\textsuperscript{1} In the present case, in addition to the tooth that was traumatically extruded, the adjacent maxillary central incisor also suffered a subluxation injury. Clinically, subluxated teeth show increased mobility in the horizontal direction without displacement from the tooth socket.\textsuperscript{7} These teeth are sensitive to percussion and gingival bleeding is often seen immediately after trauma. The prognosis for subluxated teeth with open apices is generally good and they require no specific intervention, but non-rigid splinting can be used for the patient’s comfort.\textsuperscript{7,10} Nonetheless, careful follow-up of these teeth for no less than 12 months is also needed as 8% of them will develop pulpal necrosis.\textsuperscript{7}

**Conclusion**

A case of extrusive luxation of a permanent incisor has been presented. General dentists should familiarize themselves with the latest treatment protocols for dental trauma. A correct diagnosis and prompt treatment offers a better chance of optimal healing with fewer complications.

**References**